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Title: LANL Meteorological Program: 2020 Data Completeness/Quality Report

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Acronyms and Abbreviations

Acronym	Definition
ANS	American Nuclear Society
ANSI	American National Standards Institute
DOE	Department of Energy
LANL	Los Alamos National Laboratory
LA-UR	Los Alamos – Unclassified Report
MDCN	Mortandad Canyon
NCOM	North Community
TA	Technical Area

1 Introduction

Los Alamos National Laboratory (LANL) operates four mesa-top meteorology towers: Technical Area (TA) 06, TA-49, TA-53, and TA-54. An additional tower is located in Mortandad Canyon (TA-5 MDCN), and a rain gauge at North Community (NCOM).

A description of the meteorology monitoring network is found in Dewart and Boggs (2014). Mesa-top towers are instrumented at 1.2 meters (m), 11.5 m, 23 m, and 46 m. In addition, TA-06 is instrumented at 92 m. The TA-5 MDCN tower is 10 m in height and is instrumented at 1.2 m and 10 m. Data are collected every 15 minutes. Range checking is done on each measurement every 15 minutes; data that are beyond normal ranges are eliminated from the data set and replaced by a code for missing data. In addition, data are reviewed weekly by meteorologists to identify bad data not identified by range checking. The data steward eliminates these data from the data set and replaces them with a code for missing data. The instrument technicians also review that data and schedule instrument replacement as required. Data completeness is determined by the number of total 15-minute records available versus the total number of possible measurements for the entire year. As a rule, the meteorologists do not attempt to estimate data that are eliminated as bad data. Original datalogger records, containing bad data, can be recalled from program archival storage.

The majority of missing data occur for short periods of time as a result of:

- towers down for instrument swap out/calibration,
- tower hoist inspections,
- power failures/network communication issues,
- wind propellers freezing in snowstorms, and
- temperature probe aspiration fan failure.

Only other primary instrumentation failures will be documented in this report.

2 Completeness Results

As shown below, all stations' instruments exceeded the 90% data completeness standard in 2020, except for the level 2 temperature sensor at TA-49. The TA-49 temperature measurements had a warm bias, which was determined to be a result of moisture contamination in the cable.

Table 1. Data Completeness in 2020 for all stations to meet 90% annual completeness

Sensor	Level*	TA-06	TA-49	TA-53	TA-54	TA-05	NCOM
Wind Speed	1	99.80%	99.80%	99.85%	99.85%	99.57%	
	2	99.80%	99.80%	99.85%	99.85%		
	3	99.80%	99.74%	99.85%	99.85%		
	4	99.80%					
Wind Direction	1	99.80%	99.80%	94.08%	99.85%	99.57%	
	2	99.80%	93.26%	99.85%	99.85%		
	3	99.80%	99.74%	99.85%	99.85%		
	4	99.52%					
Vertical Speed	1	99.64%	99.54%	99.82%	99.85%	99.57%	
	2	99.64%	99.54%	99.82%	99.85%		
	3	99.64%	99.54%	99.82%	99.85%		
	4	99.35%					
Temperature	0	99.98%	99.96%	99.98%	99.97%	96.69%	
	1	94.09%	99.87%	99.96%	99.96%	99.70%	
	2	99.91%	76.40%	99.96%	99.96%		
	3	99.64%	99.87%	99.96%	99.96%		
	4	99.91%					
Pressure	0	99.98%			99.98%		
Relative Humidity	0	99.95%	99.96%	99.93%	99.88%		
Dew Point	0	99.95%	99.96%	99.93%	99.88%		
Precipitation	0	99.99%	99.99%	99.99%	99.99%		99.99%
Snow Depth	0	99.99%					
Shortwave↓	0	99.97%	99.43%	99.99%	99.98%	99.99%	
Shortwave↑	0	99.97%			99.98%		
Longwave↓	0	99.97%			99.98%		
Longwave↑	0	99.97%			99.98%		
Net Radiation	0	99.97%			99.98%		
Maximum		99.99%	99.99%	99.99%	99.99%	99.99%	99.99%
Minimum		94.09%	76.40%	94.08%	99.85%	96.69%	99.99%

*Levels correspond to height. Level 0 at 1.2 m, 1 at 11.5 m, 2 at 23 m, 3 at 46 m, and 4 at 92 m.

= met 90% data completeness

= did not meet 90% data completeness

= sensor not located at that station

3 References

ANSI/ANS 3.11-2015, *Determining Meteorological Information for Nuclear Facilities,* American Nuclear Society, 2015

Dewart, J. and M. Boggs, 2014: Meteorological Monitoring at Los Alamos. LA-UR-14-23378